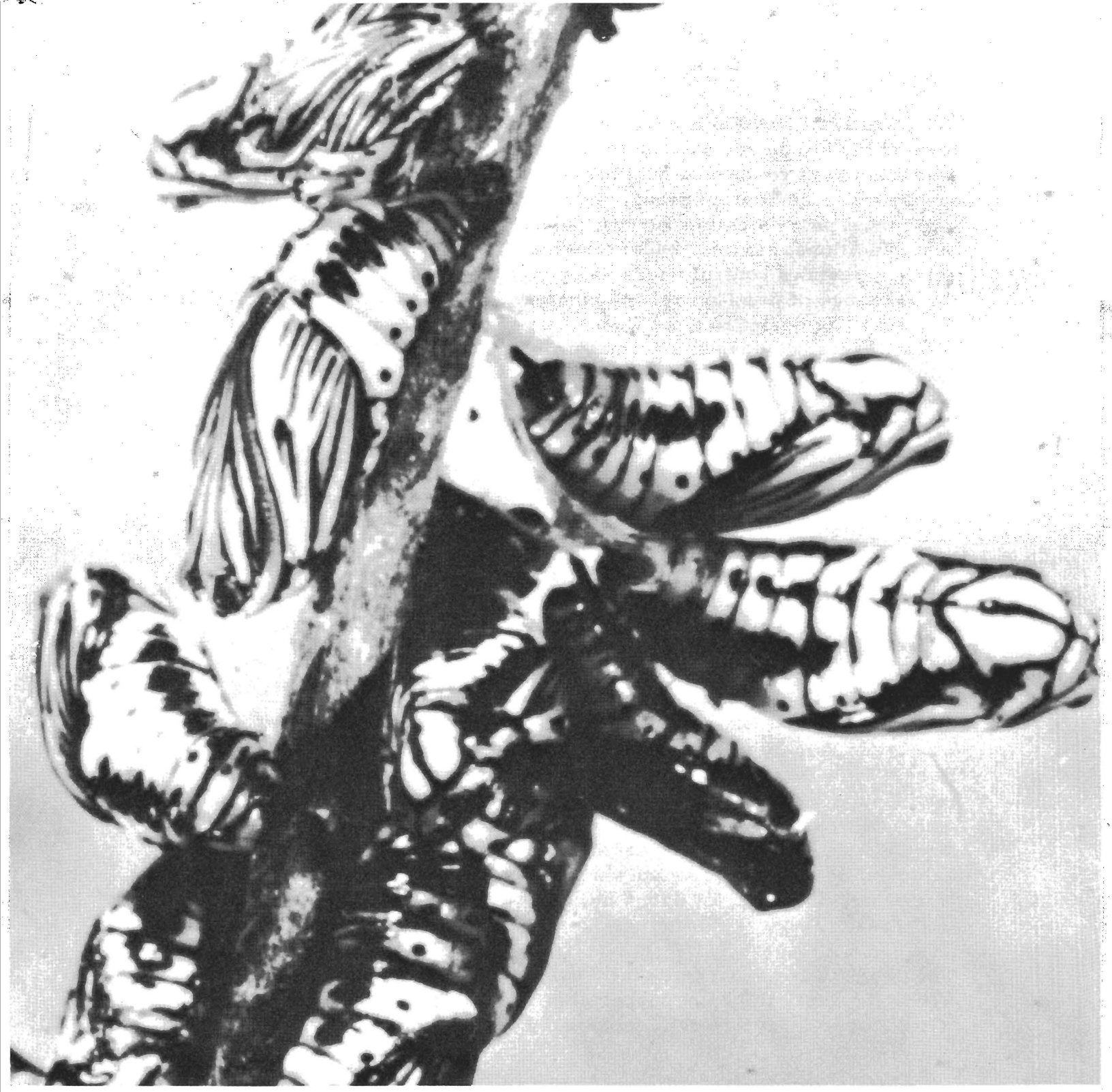

FOREST PEST CONDITIONS IN CALIFORNIA-1966

A PUBLICATION OF
THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL

THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL was formed in 1951 in recognition of the need for close cooperation among land managers concerned with forest pest problems. Primarily an advisory and coordinating group, the Council sponsors a Statewide cooperative forest pest detection survey; publishes an annual report of forest pest conditions; studies, endorses, and supports desirable pest control actions; reviews control needs and programs; and provides a forum for the exchange of pest control information. The California State Board of Forestry has designated the Council as its official advisory group for forest insect, disease and animal problems. The Council comprises the following organizations:

Boyce Thompson Institute
California Forest Protective Association
California Redwood Association
State of California: Departments of Agriculture, Conservation, Fish and Game, Parks and Recreation, and the University of California
U. S. Department of Agriculture, Forest Service
U. S. Department of the Interior, Bureaus of Indian Affairs, Land Management, Sport Fisheries and Wildlife, and the National Park Service
Western Wood Products Association

THIS REPORT, FOREST PEST CONDITIONS IN CALIFORNIA - 1966, was based largely on information provided by the California Cooperative Forest Pest Detection Survey (969 reports were received in 1966: 290 for insects, 629 for diseases, and 50 for animal pest damage), and data gathered by the Forest Service Disease Survey. The latter is a systematic inventory of forest diseases on a Statewide basis employing randomly selected, temporary plots on which all trees are examined closely by forest pathologists. To date 734 plots supporting 18,350 trees have been examined.

The report was prepared by the Forest Service and the Bureau of Sport Fisheries and Wildlife in cooperation with other member organizations of the Council. It was duplicated and distributed by the California Division of Forestry.

THE COVER PHOTO: Cluster of California oakworm pupa on an oak sprout. This insect defoliated oaks in coastal California from Mexico to Mendocino County in 1966.

Sacramento January 1967

HIGHLIGHTS OF PEST CONDITIONS-1966

STATUS OF INSECT PESTS. In the north coast area of California, populations of the Douglas-fir beetle increased sharply, resulting in one of the worst outbreaks of this insect ever recorded in California. The Jeffrey pine beetle also killed many trees in several locations in Lassen, Modoc, Plumas, Placer and Shasta Counties. In late summer, ips beetles killed large groups of young pine trees where timber stand improvement work, storm damage, or logging had created slash for breeding material earlier in the year.

Mountain pine beetles continued to kill large numbers of lodgepole pines in northern and central California. However, the level of tree killing was considered intolerable only in a few campgrounds and other high-value recreation areas. The activity of this beetle in other host species declined in 1966.

The States of Nevada and California, and Region 4 and Region 5 of the Forest Service, cooperated in a survey in 1966 to investigate the cause of continuous tree killing in the Tahoe Basin area. The survey indicated that the high endemic level of tree mortality was often associated with man-caused disturbances. A report will be prepared in 1967.

The 1966 pine cone crop was severely damaged by cone and seed insects in most areas of the State. For several consecutive seasons, seed production areas have failed to produce adequate seed crops because of insects or weather.

The European pine shoot moth, Rhyacionia buoliana, was accidentally introduced into California despite quarantine safeguards.

STATUS OF DISEASE PESTS. Forest disease conditions did not change much in 1966 from those previously reported. One new disease, red band needle blight caused by the fungus Dothistroma pini, was found in California for the first time. The disease is causing severe damage to Monterey pine in a few plantations along the north coast.

The root diseases, Armillaria mellea, Fomes annosus, and Verticicladiella wagenerii, were found at many new locations. Again, many small groups of recently killed pine and fir trees were examined closely for root diseases. Although most of the trees were infested with bark beetles, and presumably had been killed by those insects, armillaria, annosus and verticicladiella root diseases were often present at damaging levels. The annosus root disease continued to spread to freshly cut stumps in many locations throughout the State.

A continuing program of soil fumigation held seedling losses in forest tree nurseries to an unusually low level in 1966.

Numerous instances of weather damage were reported from nearly all parts of the State. This damage was caused by the following three adverse weather periods: a severe frost in mid-September of 1965; a prolonged period of subfreezing temperature, with an occasional short period of warm weather during late December and through January; and a light frost about the first of June. Damage was generally confined to small areas and varied in intensity from a slight needle scorch to severe twig and limb killing, and occasionally to the death of small trees.

STATUS OF ANIMAL PESTS. Deer depredation on young conifers continues to be the most extensive animal damage problem in the State. Most of the damage caused by other animal pests was reported to be static to increasing. Porcupine populations appear to be increasing in most of the past problem areas.

FOREST PEST CONTROL IN 1966. The detection and evaluation of a previously unreported needle blight of pines highlighted the year's control efforts and demonstrated the Council's important role in coordinating such control efforts.

Other noteworthy control accomplishments included salvage logging to suppress outbreaks of Douglas-fir and Jeffrey pine bark beetles, and thinning to prevent the buildup of mountain pine beetles in young-growth stands of ponderosa pine. Dwarfmistletoe control operations were carried out by most National Forests in the State as well as by the National Park Service and the California Division of Forestry.

STATUS OF INSECT PESTS

DOUGLAS-FIR BEETLE, Dendroctonus pseudotsugae. One of the worst recorded outbreaks of the Douglas-fir beetle killed trees in virgin Douglas-fir stands over large areas of Humboldt, Siskiyou and Trinity Counties. The center of the infestation is located in the Willow Creek-Hoopa Indian Reservation-Orleans area, extending north up the Klamath River to Happy Camp, and southeast to South Fork Mountain near Hayfork. In 1965, the beetle population increased greatly in the down host material that resulted from the storms of December 1964, and January 1965. During the spring and summer of 1966, this large beetle population emerged from the down material and attacked and killed thousands of standing trees.

The threat of the epidemic was recognized in 1965 and salvage logging to suppress the Douglas-fir beetle began promptly and continued through 1966. The salvage effort was hampered by a depressed lumber market and lack of access roads.

The full magnitude of the problem became apparent when large numbers of trees began to fade in late August and September 1966. Because many of the infested trees remained green until the end of 1966, aerial and ground surveys will be conducted in the spring of 1967 to determine the full extent of the loss.

Data obtained in population-trend surveys in late fall of 1966 on the Six Rivers, Klamath, and Shasta-Trinity National Forests indicates that the natural resistance of living trees stopped the increasing trend of the attack.

Although thousands of trees were killed by the 1966 beetle generations, many of the attacks were pitched out, many broods died as larvae under the bark, and the production of new bark beetles per square foot of bark was much reduced from the previous generations. Weather conditions could influence the course of the attack in 1967. The amount of windfall caused by winter storm and soil moisture conditions next growing season, which influences tree vigor, are the main unknown factors. However, indications are that while the high mortality rate may continue in 1967, these losses probably will decline from the catastrophic level suffered in 1966.

JEFFREY PINE BEETLE, Dendroctonus ponderosae (formerly D. jeffreyi). The outbreaks of the Jeffrey pine beetle reported in 1965 persisted through 1966 and several new infestations developed, resulting in increased Jeffrey pine losses.

The severest losses occurred in the Mt. Lassen area. Infestation centers were located on Butte Creek, Raker Bench, Tamarack Swale and West Prospect Peak, north of Mt. Lassen; and Rock Creek, Bailey Creek, Heckle Ranch, East Benner Creek, High Bridge, Willow Creek and Ruffa Ranch, south and east of Mt. Lassen. Other areas of concentrated tree killing were detected at Worley Mountain, Lassen County, and Upper Rush Creek, Modoc County.

The Jeffrey pine beetle killed large numbers of pole-sized Jeffrey pines along the shores of Mountain Meadow Reservoir near Westwood. In the fall of 1966, there were 2,300 currently infested trees in this outbreak. Many pole-sized Jeffrey pines were also killed at Carey Reservoir, Lassen County, near Adin.

Farther south, many Jeffrey pines were killed in the Willow Creek, Pierce Creek and Lights Creek drainages, and at Antelope Reservoir in Plumas County. The small, local infestation in the Martis Valley, south of Truckee, Placer County, increased in size several fold during the 1965-1966 beetle generation.

The following results of fall surveys indicate that the infestation may decline in 1967. (1) In most cases, the number of newly infested trees was nearly the same, or less, than the number of trees which had died from the 1965 attacks. (2) In many cases, the main attack shifted from the large-diameter trees invaded in 1964 and 1965, to smaller sawtimber and overstocked groups of poles. These two factors indicate a probable reduction in these infestations for the 1966-1967 beetle generation. Control by logging infested trees, and chemical treatment at a few critical locations, should help this downward trend in beetle activity.

In southern California, this beetle continued to cause damage in recreation areas around Big Bear Lake and Barton Flats in San Bernardino County.

MOUNTAIN PINE BEETLE, Dendroctonus ponderosae (formerly D. monticolae). The mountain pine beetle continued to kill lodgepole pines over extensive areas in 1966. Losses were primarily in low-value stands where control was not warranted. However, some of the infestations were important because they were in high-use recreation areas, and control was undertaken at Medicine Lake, Siskiyou County; Silver Creek, Sierra County; Wright's Lake, El Dorado County; Reds Meadow Recreation Area, Devil's-Post-Pile National Monument and Twin Lakes, Mono County. Several parcels of private land in the Lake Tahoe Basin were infested, but no control efforts were reported.

Mountain pine beetle activity in sugar pine and ponderosa pine continued at an endemic rate throughout central and northern California.

Precommercial thinning in an overstocked ponderosa pine pole stand at Joseph Creek, Modoc County, appeared to be effective in controlling this beetle in that area.

PINE ENGRAVER BEETLE, Ips spp. Drought conditions during 1966 encouraged severe outbreaks of ips beetles in young pine stands at widespread locations. Accumulations of slash from spring and summer timber stand improvement work and winter storm damage also may have precipitated these outbreaks. Severe outbreaks occurred at the following locations: Cottonwood Creek, Modoc County; Harvey Mountain, Willow Springs, Blacks Mountain, Baker Lake, Coyote Springs, Round Valley Reservoir, Carey Reservoir and Summit Lake in Lassen County; Bloomer Creek, Plumas County; Burney, and between McArthur and Pitville, Shasta County; Spring Hill, Siskiyou County, and Transfer Point Fire Station, Tehama County.

WESTERN PINE BEETLE, Dendroctonus brevicomis. Infestation centers were detected at the following widely separated locations: Middle Creek, Bowery Flat, Lake County; Squaw Flat near Pondosa, and Sacramento River Canyon, Shasta County; McCloud, Sugar Creek, Siskiyou County; Lava Peak, Lassen County; Government Flat, Grindstone Creek, Tehama County; Figueroa Mountain, Santa Barbara County, and Willow Creek, Madera County.

Outbreaks in Siskiyou and Trinity Counties, associated with last year's flood damage, subsided, and less tree killing was reported in the Bass Lake Recreation Area, Madera County. In southern California, a high endemic population continued at Lake Arrowhead, San Jacinto Mountains, Palomar Mountain and Julian.

Elsewhere in the State, losses remained at a tolerable level except for localized outbreaks. Some stands injured by fire or ips attacks during 1966 will contribute favorable host material and increase the risk in 1967.

OTHER BARK BEETLE AND FLATHEADED BORER INFESTATIONS. The fir engraver beetle, Scolytus ventralis remained inactive except at Barber Creek in the South Warner Mountains, where a small infestation was detected in late fall. Infestations of the red turpentine beetle, Dendroctonus valens remained endemic throughout the State. Maintenance control continued in southern California recreation areas to reduce the present high endemic populations of the California flatheaded borer, Melanophila californica. Larvae believed to be the flatheaded fir borer, Melanophila drummondi, were numerous in many Douglas-fir trees infested by the Douglas-fir beetle.

DEFOLIATING INSECTS. Infestations of defoliators in the coniferous forests of California were at a low level in 1966. Damage by the white-fir sawfly, Neodiprion abietis, declined but past feeding damage may lower Christmas tree values locally. Sawfly defoliation of pines was locally damaging in several infestations in the State.

The last active infestation of the tussock moth, Hemerocampa pseudotsugata, at Corral Creek Road in northern Modoc County, collapsed because of a virus disease and frost damage to tender foliage in the spring, which reduced the food supply of the young larvae. No tussock moths were detected in the areas sprayed in 1965.

Infestations of the lodgepole needle miner, Coleotechnites milleri, remained endemic in Yosemite and Sequoia and Kings Canyon National Parks, but continued at an epidemic level at Sentinel Meadows, Mono County. A needle miner in Monterey pine near Fort Bragg, Mendocino County, was identified as this species. An infestation of Coleotechnites sp. in Jeffrey pine increased in a small area on the San Bernardino National Forest. An estimated 55,000-acre infestation of a fir needle miner, Epinotia sp., detected in 1965 in red fir in Yosemite and Sequoia and Kings Canyon National Parks and the Sierra National Forest, continued into 1966 with little damage to the infested trees.

A phantom hemlock looper, Nepytia sp. near phantasmaria, which killed many Douglas-fir trees in four small outbreaks near McCloud, California, last year were severely infected with a virus disease in 1966. The predicted decline in the infestation due to a virus appeared correct since defoliation by the 1966 generation was negligible. However, in October, a localized flight of moths was detected at Hawkins Creek, Shasta County, indicating that a remnant population still exists. Moths were also collected at a new location, Weaver Bally Mountain in Trinity County.

Infestations of a pandora moth continued at a low level on the Kern Plateau, Kern County, and at Indiana Summit, Mono County. Adult specimens were recently classified as Coloradia lindsayi by a taxonomist, but there is some uncertainty regarding the species identification. In previous years, this moth was reported as Coloradia pandora.

Defoliation of hardwoods was prevalent at several locations in 1966. The California oakworm, Phryganidia californica, increased for the fourth year. The epidemic now ranges from Mexico to Mendocino County along the coast and in coastal valleys. The fall webworm, Hypantria cunea, defoliated ash and madrone near Seiad in Siskiyou County; and near Camptonville in Yuba County. A casebearer, Coleophora sp., damaged madrone near Georgetown, El Dorado County. A satin moth infestation,

Stilpnotia salicis, declined near Alturas. A tent caterpillar outbreak continued at Devil's Garden, Modoc County, but in other portions of the State, tent caterpillar activity has declined.

INSECTS OF YOUNG TREES. Several insect pests damaged plantations and young natural stands during the year. Malathion was applied by mist blower on 10 acres of the Institute of Forest Genetics, Placerville, in order to suppress the pine needle-sheath miner, Zelleria haimbachi. A small outbreak of this moth was also reported in Monterey pine near Fairfield in Solano County. A pine tip moth, probably Rhyacionia zozana, damaged new growth on 2,000 trees in the Feliciana Mountain plantations on the Sierra National Forest.

An introduced pest, the European pine shoot moth, Rhyacionia buoliana, was found in a lath house on the Davis Campus of the University of California, and in a nursery in Sacramento. The State Department of Agriculture conducted an eradication program to destroy these infestations imported on nursery stock shipped in violation of quarantine regulations. A single shipment of infested nursery stock caused both California infestations.

A variety of pitch moths continued to damage trees in the Lava Butte Plantation on the Sequoia National Forest. The principal pests appear to be Petrova edemoidana, accompanied by Hilarographa regalis, Elatobia fuliginosella and Bondia sp. An unidentified pyralid and the Sequoia pitch moth, Vespamima sequoiae, caused minor damage to small ponderosa pine in the Rhodonite seed production area, Klamath National Forest. A gouty pitch midge, possibly Cecidomyia piniinopis, caused considerable flagging of young ponderosa pine trees in several areas of northern California. In previous years, this insect was reported as Retinodiplosis inopsis.

A moth, Euzophera sp., probably the American plum borer, E. semifumeralis, was found infesting the graft union and branches of Douglas-fir grafted stock at the Badger Hill seed orchard, Eldorado National Forest. Over 30 percent of the small grafted trees were killed or damaged by this moth, previously unknown on conifers in California.

Damage by the reproduction weevil, Cylindrocopturus eatoni, was slight in 1966.

CONE AND SEED INSECTS. Insects destroyed over 70 percent of the seeds in established ponderosa pine seed production areas in 1966. The principal pest was a pine seed moth, probably Laspeyresia miscitata. Some damage to the Douglas-fir seed crop by the cone pyralid, Dioryctria abietella, was reported in a number of localities on the Six Rivers National Forest. A xyelid sawfly, Xyela radiatae, infested Monterey pine staminate flowers in Santa Cruz County near Soquel.

STATUS OF DISEASES

ROOT DISEASES. In 1966, new centers of Fomes annosus and Armillaria mellea were found throughout the State and new centers of Verticicladiella wagenerii were located in the northern portion of the State.

Fomes annosus. During the past year F. annosus was found killing ponderosa pine, Jeffrey pine, sugar pine, pinyon pine, red fir, white fir, Douglas-fir, incense-cedar, juniper, and manzanita in their native habitats.

Many new infection centers were reported throughout the forested areas of the State where cutting had occurred three or more years previously. Centers were found in campgrounds, timber sale areas, plantations established in timber sale areas, thinning areas, Christmas tree management areas, as well as in powerline and road right-of-way clearings.

Seven of the eleven thinning areas examined on the Lassen, Shasta-Trinity, Tahoe, Eldorado, Stanislaus and Sierra National Forests had one or more F. annosus centers present. A few more trees were killed at the Cal Mountain seed production area near Poison Lake in Lassen County, bringing the total trees killed to 17. Six infection centers appeared in the Trough Ridge Plantation of ponderosa pine, Colusa County, after the overstory trees were removed. The root disease showed up in a red fir Christmas tree management area in Glenn County, after the first thinning was performed. Another mature ponderosa pine died at the margin of the ever-enlarging infection center near Big Springs, Shasta County. This center has been under observation for about 45 years. F. annosus, along with A. mellea, was found in the Alpine View Campground site on the shore of Trinity Lake.

Armillaria mellea. Armillaria root disease is widespread throughout the State. An examination of the root system of a recently fallen giant sequoia, about 24 feet in diameter, in the Sequoia and Kings Canyon National Parks, revealed that a third or more of the central roots, including the tap root, had been killed by this fungus.

It was not uncommon to find a combination of Armillaria root disease and other root diseases infecting trees weakened from other causes. A. mellea was found attacking the roots of ponderosa pine infected with the black-staining root disease at four places on the Eldorado National Forest and with F. annosus on the roots of white fir in Trinity County. Several reports of mature trees being killed by A. mellea were received. Armillaria was found killing young trees around oak stumps in campgrounds, plantations, thinning areas and along right-of-way clearings.

Verticicladiella wagenerii. A center of the black-staining root disease was found on Jeffrey pine about two miles from the center being used for

experimental purposes at Blacks Mountain Experimental Forest in Lassen County. Seven new centers on ponderosa pine were located in the Georgetown Divide area of El Dorado County; at Gaddis Creek in the Blodgett Experimental Forest, at the south shore of Lake Edson, three more near Camp 10, and at Butchers Corral. The center at Butchers Corral, covering about 20 acres, is one of the largest known in commercial timber. The disease appears to have been present there for 50 to 100 years.

NEEDLE DISEASES. A needle disease known as red band needle blight and caused by the fungus Dothistroma pini was discovered for the first time in California. A survey disclosed that the disease was established in three general areas along the north coast. The southernmost infection was on Monterey pine in the Frazier Plantation at Jackson State Forest near Fort Bragg. Another center was east of Trinidad Head in T. 8N., R. 1E., Section 17, and was also on Monterey pine. The third area, near the mouth of the Klamath River, had two distinct centers about six miles apart. One center involved two plantations near the Alder Conservation Camp, and the other, the northernmost known infection center, was in a plantation in the High Prairie Creek area in the Redwood Experimental Forest. The infection at the Alder Conservation Camp started in the two Monterey pine plantations and then spread to a few shore pine in the adjacent area. At the High Prairie Creek Plantation, infection occurred on Monterey pine, Monterey x knobcone hybrids, and knobcone pine.

The disease first attacks the older needles in the lower part of the crown and then spreads upwards. After about two years many or all of the lower limbs die (on Monterey pine) and the only needles remaining are those of the current season's growth in the upper crown. Some trees have been killed at each infection center. Monterey pine appears to be the most susceptible of the tree species found infected with red band needle blight in California. The Monterey x knobcone hybrid appeared to be as susceptible or nearly as susceptible as Monterey pine. Knobcone was next on the list of susceptibility. The shore pine appears to be the least susceptible of the tree species attacked in California. The disease does not appear to be too serious on knobcone and shore pine as no dead trees were found.

The Monterey and the hybrid pine at the infection centers were lightly to severely infected with other needle diseases. The needles on some trees in Frazier Plantation were severely infected with Hypodermella limitata, and Dothichiza pithyophila, and lightly infected with Lophodermium pinicolium and Naemacyclus niveus. The first two diseases assisted Dothistroma in killing trees up to 35 or 40 feet in height. Monterey pine at Cambria was infected with another needle cast, Hypoderma pedatum.

ANIMAL PESTS

Damage by porcupines to ponderosa, Jeffrey, and sugar pine planta
larly noticeable in 1966. (A) Foresters and Wildlife biologists asse
haueser-type porcupine bait station. Note the strychnine block securely fastened to the side of t
(B) Bait stations are mounted six to eight inches above the ground to allow the porcupine to ente
overturning by deer or domestic livestock, station must be securely fastened to the ground.

WEATHER DAMAGE

Three periods of adverse weather damaged conifers in many parts of the State. The illustration shows the conspicuous flagging caused by a long period of freezing weather in January, interspersed with an occasional day of warm weather and bright sunshine.

INSECT PESTS

The California oakworm defoliated many oaks in coastal valleys of California from Mexico to Mendocino County in 1966. (A) A female oakworm depositing eggs. The last Douglas-fir tussock moth infestation collapsed in 1966, but prior damage caused by these insects is evident at many locations in Lassen, Modoc, and Plumas Counties. (B) White fir killed by tussock moth, Rail Canyon, Knox Mountain Spray Project, Modoc County.

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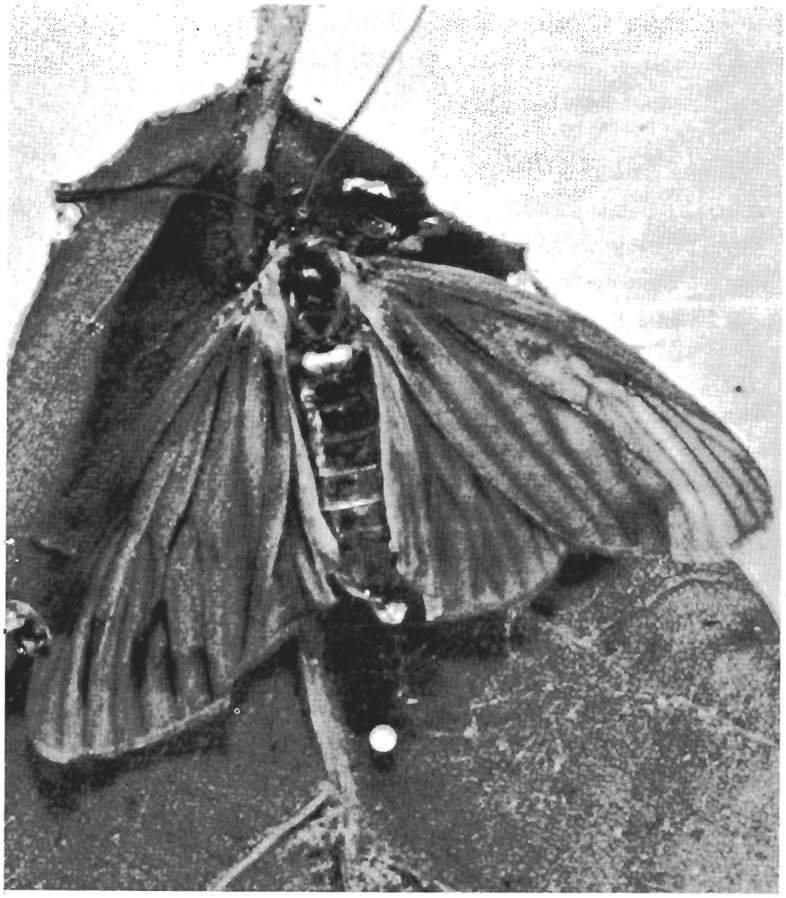
able a Weyer-
e shelter.
To prevent

DISEASE PESTS

A needle disease, Dothistroma pini, known as the red band needle blight, was collected for the first time in California in the winter of 1965. This destructive fungus disease has restricted the planting of Monterey pine in many parts of the world. The outbreak was reported promptly through the Council's Cooperative Detection Survey.



Several other needle diseases were reported. Rhabdocline pseudotsugae was found on Douglas-fir from El Dorado County northward. Elytroderma deformans appeared to be more prevalent during 1966 than it had been for some time; it was quite severe along Butte Creek on ponderosa and Jeffrey pine just north of Lassen Volcanic National Park, and at Evans Flat on the Sequoia National Forest. Hypodermella arcuata on the needles of sugar pine was the most severe yet noted and was found along the South Fork of the Stanislaus River for a distance of about three miles, at Blodgett Forest in El Dorado County, at Wildcat Creek in Plumas County, and at Sheepheaven Springs and Hungry Creek areas in Siskiyou County. Coryneum cinereum was more prevalent in 1966 than in 1965 and other needle diseases such as Lophodermium pinicolum, Lophodermina nitens, Hypodermella medusa, H. montana, and Hypoderma pini were reported. The brown-felt blight caused by Neopeckia coulteri was about the same as in 1965.

Most of the fir needle casts, blights, and molds, such as, Herpotrichia nigra, Hypoderma robustum, Stegopezizella balsameae, and Hypodermella abietis-concoloris, were at a low level of infection. Snow mold caused by Phacidium infestans var. abietis was as common in 1966 as it was in 1965. Furcaspora pinicola and Conoplea juniperis were found for the first time on the needles of white fir. Mollisia piceae was also found on dead and dying needles.

DWARFMISTLETOE. The known southern range of Douglas-fir dwarf-mistletoe, Arceuthobium douglasii was again moved southward with the discovery of the parasite at Bull Flat, Tehama County, T. 25N., R. 9W., Sections 27, 28 and 34. Dwarfmistletoe was found on western hemlock and grand fir at Jackson State Forest. It was also found on mountain hemlock on each side of the highway just below Emerald Lake in Lassen Volcanic National Park.

RUSTS ON CONIFERS. Weather conditions during the spring and summer of 1966 were not favorable for the spread and intensification of most rusts. Blister rust made little spread, even to nearby ribes, and practically all rusted leaves had fallen by mid-October. There was very little spread of pinyon rust in 1966, and indications are that infection may be the lightest since record keeping was started in 1932. Bastard toad flax, the alternate host of comandra rust, Cronartium comandrae, was not infected. Only two lightly infected leaves of chickweed (Stellaria sp.), the alternate host of the yellow witches'-broom rust, Melampsorella caryophyllacearum, were found.

Other rusts reported were, Gymnosporangium libocedri, on incense-cedar; Coleosporium madiae on needles of Monterey pine; Uderinopsis

pteridis on the needles of white fir and fronds of bracken fern; Peridermium harknessii on several different species of pine; P. stalactiforme on lodgepole and Jeffrey pine, and P. filamentosum on Jeffrey pine.

CYTOSPORA CANKER. Cytospora canker, caused by the fungus Cytospora abietis, which in recent years was beginning to show a decline in its activity, became active again in the early fall due to the very dry spring and summer. Even if precipitation is normal during the winter of 1966-67 the disease is likely to intensify well into the summer of 1967.

NONINFECTIOUS DISEASES. Reports of weather-damaged trees were submitted from most timbered areas within the State. Three periods of adverse weather contributed to the damage.

After the mid-August rains of 1965, some trees, particularly ponderosa pine located in plantations, started a second flush of growth. Conditions were not highly favorable for new growth, as only about a third of the trees responded. Many of those trees showing growth had only one or a few buds open, while the rest of the buds remained dormant. The weather continued warm until a severe frost occurred in mid-September. Nearly all twigs on which buds had burst were damaged. Twigs and stems on which the buds had opened and terminal growth had started lost not only the new growth but the spring growth as well. In some cases, the 1964 growth was also killed.

A second period of adverse weather occurred when temperatures that had remained high after the September frost suddenly dropped to well below freezing--in many areas to below zero--in late December and remained there for several weeks. The roots were completely inactivated and on a few days during that period the temperature rose to the low fifties. This was enough to start transpiration, causing a moisture loss from the needles and twigs that could not be compensated for by the roots. Strong winds were recorded and these probably contributed to the moisture loss. As a result, ponderosa and Jeffrey pine trees in many areas showed severe foliage burn. These areas, although generally small, were scattered throughout the State. Many limbs lost as much as two to three year's growth and a few trees lost a corresponding amount of leader. A typical example of winter damage to ponderosa pine occurred between Mt. Shasta City and Weed; incense-cedar, white fir, and sugar pine were also slightly damaged. A few trees in ponderosa pine plantations were killed.

A third period of adverse weather occurred about the first of June. New growth was about half developed when a light frost, occurring in local pockets, was enough to kill the current season's growth on white

fir and on any nearby Douglas-fir. Some Christmas tree plantations were damaged by this late frost.

Hail caused considerable damage to young and old trees alike in the Mt. Pinos area, Kern County. The damage was heaviest on white fir; numerous trees of this species lost most of the needles on the tips of the limbs, as well as some buds. Jeffrey pine and limber pine were also damaged by hail.

Numerous reports of chemical damage to forest trees were received. Several different chemicals were responsible for the damage. Chemical damage occurred along power lines, telephone lines, roads, in plantations sprayed for brush control, and around power houses and homes. Ponderosa pine appeared to be the most susceptible to many of the herbicide sprays, especially the grass killers.

The chlorotic decline of ponderosa pine in southern California, attributed largely to air pollution, continued with no apparent change. Several nurserymen have reported air pollution damage to plants in their nursery stock, particularly to Monterey pine.

MISCELLANEOUS DISEASES. Leaf diseases encountered during the season were, Mycospaerella arbuticola, a leaf spot on madrone; Gnomonia ulmea, leaf blight on Chinese elm; and Microsphaera alni, a mildew on leaves of shrubs. Twig diseases were, Diplodia pinea, killing tips of Monterey pine; Dothiorella sp., killing twigs and branches of oak; and Sphaerotheca lanestris on leaves and twigs of live oak. The European mistletoe, Viscum album, was found in the Sebastopol area on nine different tree species, including apple, black locust, big leaf maple, and black walnut. The cypress mistletoe, Phordendron bolleanum var. pauciflorum, was reported on McNab cypress. Atropellis pinicola was found killing twigs of sugar pine; Scheroderris abieticola killed white fir twigs, and Cenangium furruginosum appeared to be killing twigs and limbs of Jeffrey pine in a plantation. All common heart rots were reported again in 1966, along with some not so common.

NURSERY DISEASES. The continuing program of soil fumigation before seeding held losses in forest tree nurseries to a low level in 1966.

STATUS OF ANIMAL PESTS

Animal damage conditions were compiled from the data gathered through questionnaires sent to managers of all major private and public owned forests in California, continuing the survey started last year to document more fully the animal damage occurring on forest lands.

DEER. Deer depredation continued as the most extensive animal damage problem for forest regeneration in the State. Some degree of deer damage to every species of conifer that is being planted has been reported. Depredation ranged from slight and decreasing to severe and increasing. In general, it appears that as the rate of reforestation increases, deer depredation increases.

PORCUPINE. Porcupines appear to be on the increase throughout most of their range. Damage to ponderosa, Jeffrey, and sugar pine plantations, was particularly noticeable in 1966.

RABBITS. Depredation by rabbits appears to be more widespread than in previous years. Damage was recorded from the Angeles, Cleveland, Los Padres, Mendocino, and Shasta-Trinity National Forests. Jeffrey, ponderosa, sugar, Coulter pines, and Douglas-fir in the one- to four-year-age class were damaged most severely.

POCKET GOPHER. Nine incidents of pocket gopher damage were reported. The damage occurred primarily on ponderosa, Jeffrey, and sugar pine in the one- to ten-year-age class. Damage ranged from static to increasing.

BEAVER. Beaver problems were reported from four areas in the Sierra Nevada. Damage was confined primarily to low-grade hardwoods and white fir. In these areas, beaver activity has created minor flooding and erosion problems.

TREE SQUIRRELS. A negligible amount of bark stripping occurred in the coastal redwood region. The San Bernardino National Forest experienced a considerable amount of similar damage to Jeffrey and Coulter pine in its recreational areas.

MEADOW MICE. Minor damage to young Douglas-fir, Sierra redwood, and pine plantation stock was reported on two areas. At present, meadow mice do not appear to be a problem; however, this may change, as meadow mouse populations are subject to extreme fluctuations.

DUSKY-FOOTED WOODRATS. There were four reports of woodrat damage in plantations of one- to four-year-age class. Three were from conifer plantings, while the fourth was reported from a eucalyptus plantation. In all cases but one, the damage appeared to be increasing.

ELK. There were two reports of elk damage to Douglas-fir and Monterey pine in the north coastal area. Damage was reported to be light and constant in both areas.

BLACK BEAR. Bear damage, primarily to Douglas-fir and redwoods of the 20- to 60-year-age class, continued in the north coastal areas. Reports indicated that the damage was occurring at a light but constant rate.

BIRDS. One incident of bird damage to five-year-old to mature Douglas-fir was reported. Damage was light.

SMALL SEED-EATING RODENTS. The Plumas National Forest reported a seeding failure due to rodents on approximately 80 acres of a 200-acre plantation drilled and seed spotted to conifers. These animals annually destroy large quantities of conifer seed; however, an accurate determination of seed loss is impossible.

ANNUAL SUMMARY OF ANIMAL DAMAGE TO CALIFORNIA FORESTS*
FISCAL YEAR 1965-66

ANIMAL	TREE SPECIES	AGE CLASS	NO. OF TREES	ACRES DAMAGED	PLANTATION OTHER	DAMAGE INCREASING OR DECREASING
Beaver	Cottonwood White Fir	All Classes	6,000	2,000	Other	Increasing
Birds	Douglas-Fir	5-30	No details given			Low-Static
Black Bear	Redwood Douglas-Fir	20-60	Unknown	10,000	Other	Low-Static
Deer	Douglas-Fir Jeffrey Pine Ponderosa Pine Coulter Pine Monterey Pine Mountain Mahogany White Fir Incense-Cedar Redwood	1-15	445,500	46,204	Plantation	No Trend Determined
Dusky-Footed Woodrat	Douglas-Fir Ponderosa Pine Eucalyptus	1-4	21,500	127	Plantation	Increasing
Elk	Douglas-Fir	5-20	Unknown	50	Plantation Other	Static
Meadow Mice	Redwood Douglas-Fir Pine	1-4	108	406	Plantation	Low-Decreasing
Mountain Beaver			No damage reported			
Pocket Gophers	Jeffrey Pine Ponderosa Pine Sugar Pine	1-10	24,035	260	Plantation	Static to Inc.
Porcupine	Jeffrey Pine Ponderosa Pine Sugar Pine	All Age Classes	33,300	1,840	Plantation Other	Increasing
Rabbits	Jeffrey Pine Ponderosa Pine Sugar Pine Coulter Pine Douglas-Fir	1-10	8,020	1,030	Plantation	Static to Inc.
Small Seed Eating Rodents	Jeffrey Pine Ponderosa Pine Sugar Pine Douglas-Fir	Seed	Unknown	80	Plantation	Increasing
		Accurate determination of seed lost to these rodents is impossible to determine				
Tree Squirrels	Ponderosa Pine Jeffrey Pine Sugar Pine Redwood	Pole-Mature	4,700	230	Other	Static to Increasing

* From data on approximately 40 questionnaires received from throughout the State.

PEST CONTROL IN CALIFORNIA

Detection, evaluation and prevention, as well as suppression, are important phases of forest pest control operations in California. The following paragraphs present the control highlights of 1966 in each of those categories.

RED BAND NEEDLE BLIGHT. The discovery of a previously unreported forest disease again demonstrated the Council's important role in coordinating control efforts.

In the winter of 1965, a needle disorder was discovered in a plantation of Monterey pines in Del Norte County. The outbreak was reported promptly through the Council's Cooperative Detection Survey, and identified by State and Federal pathologists as red band needle blight, a destructive fungus disease that has severely restricted the planting of Monterey and other pines in many parts of the world, but that had not been reported previously in California.

In June 1966, the Council's Disease Committee met at the site of the discovery to consider possible joint action. As an initial step, the Committee decided on a two-phase cooperative survey to determine the extent and intensity of the outbreak. The first phase, to be undertaken by individuals in the course of other field work, involved examining Monterey pine plantings in coastal counties from Monterey north and in the counties immediately adjacent to them. The second, to be conducted concurrently and largely by the California Department of Agriculture, called for examining commercial nurseries throughout the State. The Forest Service and University of California assumed joint responsibility for coordinating the entire effort.

During the summer, about 50 foresters and pathologists, representing private, State, County and Federal interests, examined all major Monterey pine plantings in the survey area, including plantations, Christmas tree farms, and landscape plantings, while specialists of the California Department of Agriculture and other agencies visited most of the nurseries in the State that deal in pine trees.

By the end of October, nearly 300 survey reports had been submitted, although substantially more plantings and nurseries had been visited. Only one additional infection center was found, bringing the total to four. All infection centers were small, of recent origin, and located in pine plantations in the coastal portions of Mendocino, Humboldt and Del Norte Counties.

In early November the Disease Committee met again to evaluate survey results. Since infection was limited to plantations in sites particularly

favorable for infection, and since no infection was discovered either in naturally occurring trees or in nurseries, the Committee decided against recommending immediate suppressive action, but advised continuation of the survey for at least two years.

By the end of the year 324 reports had been submitted, and seven infection centers at three locations had been found. All infection occurred on planted trees in the north coastal area.

DWARFMISTLETOE CONTROL. Dwarfmistletoe, mainly that of ponderosa and Jeffrey pine, is now receiving increased attention from land managers throughout the State. Control consists of two distinct operations: suppression in selected stands by cutting infected trees and branches, and presuppression evaluation to determine if particular infected stands qualify for treatment. In 1966, control projects were carried out on nearly all the National Forests in the State, as well as in Kings Canyon Nationl Park and Mountain Home State Forest. Suppression units were located on both timber and recreational lands.

On timber lands, suppression usually is justified in lightly infected stands, but not in severely infected ones; in seedling and sapling stands but not in large poles and small sawtimber; and where surplus stocking is present, but not where existing stocking is already minimal. Most of the suppression in 1966 was performed in conjunction with otherwise programed timber sales and precommercial thinnings.

On recreation lands, suppression priority was given to potential sites scheduled for development within 10 years. Although some work was done in developed sites, suppression procedures ranged from thinning and pruning as practiced on timber lands to intensive tree-by-tree sanitation in high-use campgrounds.

TAHOE BASIN EVALUATION. During a two-week period in the fall of 1966, a team of foresters, entomologists, and pathologists representing the States of California and Nevada as well as Regions 4 and 5 of the Forest Service, made an extensive survey of insect and disease conditions in the Tahoe Basin. A report presenting findings and recommendations is in preparation.

NEW EVALUATION PROCEDURES. Insect evaluation efforts in California were augmented substantially in 1966 in direct response to a 1965 Council resolution. During the year, State and Federal entomologists adopted several new techniques, including the radiographic examination of infested bark samples and aerial sampling, that will facilitate the evaluation of outbreaks by the western pine beetle and other bark beetles.

THINNING FOR INSECT CONTROL. Field testing of thinning as a means of preventing outbreaks of mountain pine beetle in young-growth ponderosa pine has been underway by the Forest Service at Joseph Creek, Modoc County, for several years. Preliminary results, suggesting less buildup in thinned than in unthinned stands, hold promise for wider application of this method of control.

LOGGING FOR INSECT CONTROL. The salvage logging operations in northwestern California that followed the disastrous storms of 1964-1965, were not effective in suppressing the Douglas-fir beetle outbreak. Consequently, the Indian Service and the Klamath, Six Rivers and Shasta-Trinity National Forests will continue their accelerated salvage sale programs into 1967.

Outbreaks of the Jeffrey pine beetle in Lassen, Plumas and southeastern Shasta Counties received the close attention of private and Government foresters during the spring and summer of 1966. Suppressive action, largely through salvage logging, but supplemented by direct treatment with lindane, was undertaken by the Lassen and Plumas National Forests. Suppression will be continued into the spring of 1967. The California Division of Forestry and Forest Service, in cooperation with affected landowners, started suppression of the outbreak on private lands adjacent to the Mountain Meadow Reservoir near Westwood in November 1966.

Elsewhere in the State, bark beetle suppression was required only for small, localized outbreaks. More suppression work was done in campgrounds and other high-use recreation sites than in previous years. Maintenance insect suppression was continued in southern California largely through cooperative projects involving the California Division of Forestry, private landowners and the Forest Service.

TABLE I
INSECT CONTROL ACTIONS RECOMMENDED BY THE COUNCIL

INFESTATION AREA	ESTIMATED ACREAGE	COUNTY	INSECT	HOST	RECOMMENDED ACTION
BARK BEETLES					
Antelope, Pierce and Lights Creek	6,000	Plumas	Dj	JP	Log and spray where warranted
Bass Lake	9,000	Madera	Db,Ips,Dm	PP,SP	Maintenance control
Joseph Creek	1,000	Modoc	Dm	PP	Surveillance
Kelly Cabin	2,000	Mendocino	Db,Ips	PP	Log and spray where warranted
Manzanita, Bond Valley and Ruffa	5,000	Plumas	Dj	JP	Log or spray infested trees
Medicine Lake	500	Siskiyou	Dm	LP	Fall and spray
Mountain Meadow Reservoir	2,000	Plumas	Dj	JP	Spray or burn infested trees
North Coast Area	100,000	Humboldt, Siskiyou, Trinity	Dp	DF	Log infested trees
Reds Meadow	1,000	Mono	Dm	LP	Treat or protective spray
South Warners	12,000	Modoc	Db,Dm,Dj	PP,SP,JP	Log infested trees
DEFOLIATORS					
Defoliators, Statewide		Statewide	Hp,Cp,Na,Np,Em, Gm	WF,JP,RF,LP DF	Surveillance
Julian	25,000	San Diego	Pc, M sp.	O	Surveillance and research
Sentinel, Crooked and Wet Meadows	2,200	Mono	Gm	LP	Surveillance
Sierra N.F., Yosemite N.P. and Sequoia and Kings N.P.	55,000	Madera, Mariposa	Em	RF	Surveillance and research
Snow Valley	100	San Bernardino	C sp.	JP	Surveillance
Taylor Meadows-Bartola	7,500	Tulare, Kern	Cp	JP	Surveillance
PLANTATIONS AND EXPERIMENTAL AREAS					
Davis Campus	100	Yolo	Rb	Pines	Surveillance
Institute of Forest Genetics	2,000	El Dorado	Db,Ips	PP	Treat infested trees
Plantations		Statewide	Ce,Misc.	PP,JP,SP,DF	Detection and evaluation as needed
Seed Production Areas		Northern California	C&S	PP	Evaluation, research
STATE AND NATIONAL PARKS					
Cuyamaca Rancho State Park	8,000	San Diego	Mc,Db	JP,PP	Maintenance control
Lassen Volcanic National Park	3,000	Shasta,Lassen	Dj,Db,Dm	JP,PP,SP,LP	Maintenance control
San Jacinto State Park	700	Riverside	Db,Ips,Mc	CP,PP,JP	Maintenance control
Sequoia and Kings Canyon	8,500	Fresno	Db,Dm	PP,SP	Maintenance control
Sequoia and Kings Canyon	400	Tulare	Rm	LP	Surveillance
Yosemite National Park	57,700	Mariposa, Tuolumne	Db,Dm,Dj	PP,SP,JP,LP	Maintenance control
Yosemite National Park	5,000	Tuolumne	Gm	LP	Surveillance
Anza Borrego	500	San Diego	Db,Mc	CP	Maintenance control
SOUTHERN CALIFORNIA FOREST RECREATION AREAS					
Arrowhead-Crestline	47,000	San Bernardino	Dm,Db,Ips,Dj	PP,DP,JP	San.-salvage and maintenance control
Arroyo-Seco District	3,000	Los Angeles	Db,Ips,Mc	PP,CP,JP	San.-salvage and maintenance control
Agua Tibia Wild Area	400	San Diego	Db,Ips	CP	Treat infested trees
Big Bear Valley	8,800	San Bernardino	Dj,Ips,Mc,Sv	JP,WF	Log and maint. control according to plan
Corte Madera	1,600	San Diego	Db,Ips,Mc,Dv	CP,JP,PP	Maint. control according to plan
Cuyamaca	12,000	San Diego	Db,Ips,Mc	CP	Maintenance control
Idyllwild-San Jacinto	37,000	Riverside	Mc,Db,Ips,Dm	PP,CP,JP	San.-salvage and maintenance control
Laguna Mt.	9,700	San Diego	Db,Mc	CP,JP	Maint. control according to plan
Lost Valley	4,000	San Diego	Db,Ips	CP	Maint. control according to plan
Mt. Baldy District	1,500	Los Angeles	Ips,Dj,Dm,Mc,Db	PP,JP,CP	San.-salvage and maintenance control
Mt. Pinos District	7,900	Ventura, Kern	Mc,Ips	JP	San.-salvage and maintenance control
Palomar Mt.	6,600	San Diego	Db,Sv	CP,WF	Maintenance control
San Gorgonio District	25,000	San Bernardino	Db,Dj,Ips	PP,JP,CP	San.-salvage and maintenance control
Ranger Peak-Figueroa Mt.	700	Santa Barbara	Db,Ips,Dv	PP,CP	Maintenance control according to plan
Valyermo District	14,600	Los Angeles	Mc,Ips	JP,WF	San.-salvage and maintenance control
Wrightwood	2,000	San Bernardino	Mc,Ips	JP	Maintenance control
Julian	5,000	San Diego	Db,Ips	CP	Maintenance control

Abbreviations Used in Tables

INSECTS

C sp. - Jeffrey pine needle miner
Ce - Pine reproduction weevil
Gm - Lodgepole needle miner
Cp - Pandora moth
C&S - Cone and seed insects
Db - Western pine beetle
Dj - Jeffrey pine beetle
Dm - Mountain pine beetle
Dp - Douglas-fir beetle
Dv - Red turpentine beetle
Em - Fir needle miner
Hp - Douglas-fir tussock moth
Ips - Pine ips
M sp. - Tent caterpillar
Mc - California flatheaded borer
Na - White-fir sawfly
Np - Phantom hemlock looper
Pc - California oakworm
Rb - European pine shoot moth
Sv - Fir engraver

HOST

CP - Coulter pine
DF - Douglas-fir
JP - Jeffrey pine
LP - Lodgepole pine
O - Oaks
PP - Ponderosa pine
RF - Red fir
SP - Sugar pine
WF - White fir

RESOLUTIONS ADOPTED BY THE CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL - 1966

At its annual meeting in November the Council took the following action:

1. Endorsed insect suppression projects listed in Table 1.

2. Recommended a stepped-up research program to find suitable substitutes for chemicals 1080 and endrin for protecting seeds from rodents; and, until alternate compounds are found reevaluate the dosage, baits, and application methods necessary to achieve control of rodent damage in California with endrin and compound 1080.

3. Opposed the passage of Senate Bill 3608 (Senator Gaylord Nelson) which would prohibit sale, shipment, and use of DDT within the United States.

4. Endorsed the principle of service contracts in addition to timber sales for removing insect-infested trees on public lands.

5. Recommended that the Bureau of Sport Fisheries and Wildlife reactivate the research biologist position at Redding for continued study on animal damage.

6. Recommended that the Bureau of Sport Fisheries and Wildlife increase its efforts to find effective means of controlling pocket gophers in plantations.

7. Recommended that the California Legislature take action to implement the 1950 Game Management policy of the Fish and Game Commission that big game populations be kept in balance with food supplies, and revise the deer depredation law to eliminate a recent change which prohibits issuance of depredation permits until damage is actually occurring or immediately threatened.

8. Recommended that the State Extension Service employ a full-time forest disease specialist.